T-COM

MODEL 70A

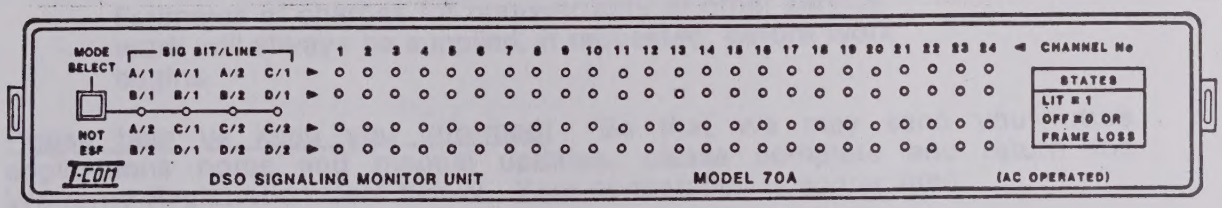
INSTRUCTION MANUAL

T-COM Corporation 825 East Middlefield Road Mountain View CA 94043 (415) 964-3415

T-COM

MODEL 70A

INSTRUCTION MANUAL



Instrument S/N : _____

HW/SW Release :

Instruction Manual No. : IM 070A-001

Date isssued : August 1990

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WARRANTY REGISTRATION CARD

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NOTE:
All references in this manual to the series 440A include both the 440A and 440A-1 models

1. GENERAL INFORMATION

SCOPE

1.1 This instruction and operation manual contains information to install, operate and verify the operational integrity of the T-COM model *70A DS0 Signaling Monitor Unit*.

INTRODUCTION

1.2 The model 70A is an add-on module for the T-COM 220A+, 320A+, and 440A. When added to either instrument, the DS0 Signaling Monitor Unit provides for the simultaneous display of all signaling states associated with each of the 24 channels in up to two DS1 lines.

The 70A operational features include several display modes to facilitate the observation of signaling states in superframe and extended superframe formatted bit streams.

Specific applications of the 70A include:

- detection of out-of-service channel condition
- quick detection of signaling problems affecting several channels
- immediate detection of idle channels
- service utilization gauge

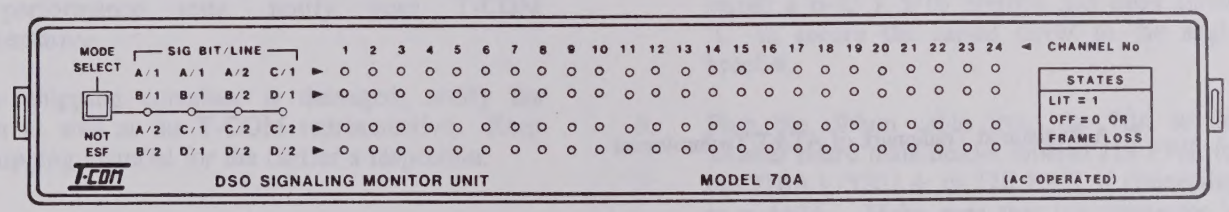

Figure 1.1 Front Panel

1.3 PERFORMANCE SPECIFICATIONS

System Format Compatibility

Channel bank	SLC™96, D1D, D2, D3, D4, D5 and D5 with ESF

Display Mode Selection

	(SIG BIT/LINE)			
Mode	Row 1	Row 2	Row 3	Row 4
1	A/1	B/1	A/2	B/2
2	A/1	B/1	C/1	D/1
3	A/2	B/2	C/2	D/2
4	C/1	D/1	C/2	D/2

Miscellaneous

Power Input	Internally provided from 220+/320+/440 (when AC powered only)
Operating temp	10 to 40 °C (50 to 104 °F)
Storage temp	-30 to +70 °C (-22 to 158 °F)
Humidity	Up to 90% non-condensing
Dimensions	2.12" (H) x 13.5" (W) x 10" (D)
Weight	3.5 lbs (1.6 kg)

Accessories

2888-003	Canvas carrying case for combination 70A/220A+, 70A/320A+, 70A/440A
2888-004	Polyethylene shipping case for combination 70A/220A+, 70A/320A+, 70A/440A
IM070A01	Extra Instruction Manual

Replacement Part

2751-073	Front cover assembly for combination 70A/220A+, 70A/320A+, 70A/440A

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2. INSTALLATION

INTRODUCTION

2.1 This section contains information and instructions for installing the model 70A. Included are inspection procedures, directions for installing the unit on the models 220A+, 320A+, 440A, preparation for use, and repacking for shipment.

INITIAL INSPECTION

2.2 Inspect the shipping container for damages. Should any damage be found, the container must be kept until all contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. Procedures for checking the electrical performance are provided in section 3. If the contents are incomplete, if there is mechanical damage or defect, or if the instrument does not pass the performance tests, notify your T-COM representative.

If the shipping container is damaged, notify the carrier as well as the T-COM representative. Keep the shipping material for the carrier's inspection.

INSTALLATION

2.3 When acquired separately, the 70A can be installed on any T-COM model in the 220A+, 320A+ and 440A series by following the procedure given below. While carrying out the installation procedure, make sure that the instrument is disconnected from the AC line. Refer to figure 2.1

1. 220A+/320A+/440A Top cover removal. Remove the 6 screws holding the top cover, using a medium size phillips screwdriver. This top cover is not used with the combination 220A+/70A, 320A+/70A, or 440A/70A and may be stored away.

2. Remove the 220A+, 320A+ or 440A rear panel by unscrewing the 6 screws holding it to the rear bezel. To disconnect the cable connecting the power supply to the mother board, firmly grasp the female connector at J8 for the 220A+ or 320A+, or J21 for the 440A, and lift it from the mother board. If the test set is equipped with option 03, remove the cable connecting the DS0 interface board on the rear panel to the mother board. This connector is labeled J10 DS0 on the 220A+/320A+ mother board and labeled J27 on the 440A mother board.

3. Install the angle bracket 'A' as shown, using a pan head screw 6-32 x 1/4 'B'. The threaded hole must be on the vertical member as it is used to retain the 70A rear panel.

4. Install the raised cover (70A) on top of the 220A+/320A+/440A instrument, carefully guiding the sides alongside the front and rear bezels.

5. Secure the raised cover with 4 phillips screws previously securing the top cover. In addition, install a 6-32 x 5/16 phillips pan head screw 'C' to secure the raised cover to the angle bracket.

6. Plug the ribbon cable from the 70A to the mother board male header labeled J19 PWR for the 220A+/320A+ or J20 PWR if connecting to a 440A. Make sure that the connector is properly aligned with the header.

7. Connect the remaining ribbon cable from the 70A to the 220A+/320A+ connector labeled J21 or for a 440A to the connector labeled J22 70A.

8. Plug the ribbon cable from the rear panel power supply to the mother board male header labeled J8 for a 220A+/320A+ or labeled J21 for a 440A. If the 220A+/320A+/440A is equipped with option 03, connect the DS0 interface board on the rear panel to the mother board male header labeled J10 DS0 for the 220A+/320A+ or J27 DS0 for the 440A.

9. Install the rear panel in place and secure it with the 6 pan head screws previously holding it in place.

This completes the installation procedure.

Figure 2-1 70A Installation View

PREPARATION FOR USE

2.4 When the 70A is installed on the 220A+/320A+/440A instruments according to the procedure in paragraph 2.3, it is ready for use. The 70A becomes operational when AC power is supplied to the 220A+/320A+/440A and the power switch on the instrument is turned to ON.

RACK MOUNTING

2.5 The 220A+/320A+/440A may be rack mounted in 19" or 23" racks. For 19" racks order part number 2750-032-P. For 23" racks order part number 2750-033-P.

REPACKING FOR SHIPMENT

2.6 All equipment returned to the factory must be accompanied by a T-COM Return Authorization number. In order to get an RA number, customers should call in, or write, with the model and serial numbers of equipment to be returned *PRIOR TO* shipment. A number will be issued, which will be referenced on both the packing slip and the purchase order associated with the equipment. Include with the instrument a clear description of the encountered problem(s) along with the conditions in which it (they) occur. This can often greatly reduce the cost of repair.

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The use of the original shipping carton and packing material is highly recommended. If the original packing material is not available, any strong container can be used. Wrap the instrument in heavy paper or a plastic bag, and surround it with two or three inches of shock absorbing material to cushion it firmly and prevent movement inside the container.

3. OPERATION

INTRODUCTION

3.1 This section provides operating information, explains the functions of the 70A control and indicators as well as the measurement capabilities of this unit when it is used in combination with the 220A+/320A+/440A instrument family.

FRONT PANEL FEATURES

3.2 The 70A front panel features are described below. The description numbers match the numbers in figure 3.1

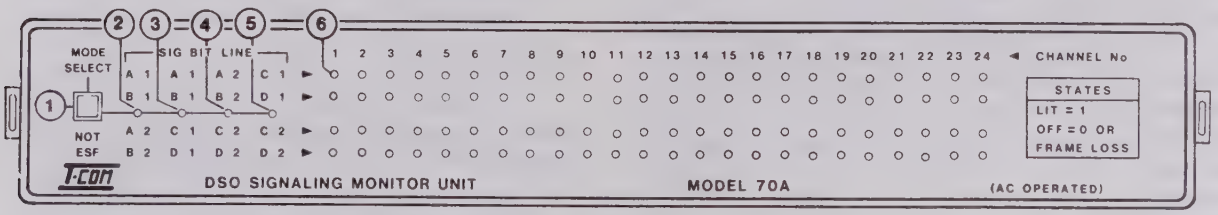

Figure 3.1 Front Panel Features

1. MODE SELECT -- This key is effective only when the associated 220A+/320A+/440A selection is D5-ESF. When this is the case, successive depressions of this key cause the mode selection to change from 1 to 2, from 2 to 3, 3 to 4, 4 to 1 etc. When the 220A+/320A+ or 440A SYSTEM selection is set to SLC-96, D1D, D2, or D3/D4/D5, mode 1 prevails and this control is not effective. In this case, the depression of the MODE SELECT key merely results in flashing the LED in this key to indicate that the selection is not ESF.

2. A/1, B/1, A/2, B/2 -- This LED identifies that the four rows of 24 LED's are assigned as follows:

   Row Assignment
   - top signaling state A in each channel in line 1
   - 2 signaling state B in each channel in line 1
   - 3 signaling state A in each channel in line 2
   - 4 signaling state B in each channel in line 2

3. A/1, B/1, C/1, D/1 -- This LED identifies that the four rows of 24 LED's are assigned to display respectively the A, B, C, and D signaling states associated with line 1.

4. A/2, B/2, C/2, D/1 -- This LED identifies that the four rows of 24 LED's are assigned to display respectively the A, B, and D signaling states associated with line 2.

5. C/1, D/1, C/2, D/2 -- This LED identifies that the top two rows of LED's are assigned to display the C and D signaling states associated with line 1 while the bottom two rows display the C and D states associated with line 2.

6. LED -- This LED corresponds to channel 1. Depending upon the mode selection, it displays the state of the signaling bit A or C. It is lit when the state is '1'; it is off when the state is '0' or when the corresponding bit stream does not have a framing bit sequence consistent with the SYSTEM selection.

OPERATIONAL CAPABILITIES

3.3 As a dedicated signaling display, the model 70A basically offers the means to simultaneously display signaling states associated with all 24 channels in one or two DS1 bit streams. This complements the single channel signaling monitor capability provided by the 220A+/320A+/440A instrument series.

The signaling states displayed by the 70A are associated with the bit stream(s) monitored by the 220A+/320A+/440A instrument. When the instrument SYSTEM selection is SLC-96, D1D, D2, or D3/D4/D5, the two upper rows of 24 LED's display the A and B signaling states associated with line 1 and the two lowest rows display the A and B signaling states associated with line 2. When the instrument SYSTEM selection is D5-ESF (or D5-Fe in some models), the LED display system can also be assigned to the following three state/line combinations:

1. the four rows respectively display the A, B, C, and D states for line 1
2. the four rows respectively display the A, B, C and D states for line 2
3. the top two rows display the C and D signaling states for line 1 and the bottom two display the C and D signaling states for line 2.

Regardless of the mode selection, each LED in the display system is lit when the corresponding state is '1' and is turned off if the state is '0'. The LED's associated to a line are also turned off when the instrument fails to acquire or retain framing on that line.

The 70A is not operational when the 220A+ or 320A+ operates on battery. This prevents the considerable LED current load from quickly depleting the battery. The 440A is not available with a battery option.

Aside from the MODE selection applicable to the ESF format, the use of the 70A requires no particular set-up or selection. Whenever framing can be obtained on a monitored bit stream, the 70A automatically displays signaling states associated with each of the 24 channels, according to the MODE selection.

APPLICATIONS

3.4 The simultaneous display of the signaling states associated with all 24 DS0 channels in one or two DS1 streams makes possible the following observations:

- immediate detection of idle channels
- detection of non-functional channels
- detection of signaling problems affecting multiple utilization
- obtain a gauge of the call rate and service utilization

> **Remark:**
> The A and B signaling bit state assignment depends on the type of channel unit used in the channel bank. A copy of the assignment listing provided by AT&T is given in paragraph 3.5. The C and D signaling states made available by the ESF format are expected to be used as part of new services provided by the D5 channel bank generation.

DETECTION OF IDLE CHANNELS

3.4.1 As observed from the signaling state assignment table in paragraph 3.5, most types of channel units set both A and B signaling bits to state '0' when idle and to state '1' when busy. As a result, a glance at the display readily identified whether a channel is idle or busy. However, it must be noted that because not all types of channel units use the same state convention, it is recommended to ascertain the type of channel unit used before concluding the status of a channel unit from the displayed signaling states.

By monitoring the content of a selected channel with the 220A+/320A+/440A. it is always possible to determine the state of the signaling bits identifying the idle state. When the channel is idle, the decoded VF contains only a low level noise, otherwise some tone or voice signal is heard with the speaker and the corresponding signaling state is displayed in the CHANNEL MONITOR section at the same time.

The observation of the idle condition for all 24 channels over time can provide a subjective gauge of the traffic on a particular line. Because the 70A allows for the simultaneous monitoring of two DS1

lines, it is also possible to perform subjective traffic comparisons between systems.

DETECTION OF NON-FUNCTIONAL CHANNELS

3.4.2 The detection of non-functional channels is made by noting signaling state deviations from the norm. The following problem conditions can be readily detected by direct observation.

1. one or more channel(s) cannot be seized; this is indicated by the idle state prevailing permanently while other channels are showing a normal pattern of seizure and idleness.

2. one or more channel(s) is (are) always seized. On most systems, this is not a normal condition. This condition is detected by noting that the idle state never occurs in the particular channel(s).

3. the signaling states associated with a particular channel do not correspond to the convention for the type of channel unit used in that time slot.

DETECTION OF PROBLEM CONDITION AFFECTING MULTIPLE CHANNELS

3.4.3 The 70A display can give at a glance the indication that a signaling problem is common to two or more channels. In this case, the display of the signaling states reflects simultaneous state changes in multiple channels. The cause for this problem is sometimes associated with a defective common equipment circuit.

SIGNALING STATE ASSIGNMENT

3.5 The tables 3.1a through 3.1c, on the following pages, provide a summary of the signaling state assignments for the most commonly used types of channel units.

CHANNEL UNIT TYPE	OFFICE CONDITION TO CHANNEL UNIT	TRANSMITS @ SIGNALING A	TRANSMITS @ SIGNALING B	RECEIVES @ SIGNALING A	RECEIVES @ SIGNALING B	CHANNEL UNIT CONDITION TO OFFICE
DPO XMT	LOOP OPEN	0	0	*	*	*
	LOOP CLOSURE	1	1	*	*	*
DPO RCV	*	*	*	0	*	NORMAL BATTERY
	*	*	*	1	*	REVERSE BATTERY
DPT XMT	NORMAL BATTERY	0	0	*	*	*
	REVERSE BATTERY	1	1	*	*	*
DPT RCV	*	*	*	0	*	LOOP OPEN
	*	*	*	1	*	LOOP CLOSURE
4WE&M 2WE&M XMT	M-LEAD GROUNDED, OR OPEN	0	0	*	*	*
	M-LEAD BATTERY	1	1	*	*	*
4WE&M 2WE&M RCV	*	*	*	0	*	E-LEAD OPEN
	*	*	*	1	*	E-LEAD GROUNDED, OR LOOPED
RPO XMT	LOOP OPEN	0	0	*	*	*
	LOOP CLOSURE	1	1	*	*	*
RPO RCV	*	*	*	0	1	NORMAL BATTERY, NO REVERTIVE PULSE
	*	*	*	0	0	NORMAL BATTERY, REVERTIVE PULSE
	*	*	*	1	*	REVERSE BATTERY, NO REVERTIVE PULSE
RPT XMT	NORMAL BATTERY, NO REVERTIVE PULSE	0	1	*	*	*
	NORMAL BATTERY, REVERTIVE PULSE	0	0	*	*	*
	REVERSE BATTERY	1	0	*	*	*
RPT RCV	*	*	*	0	0	LOOP OPEN
	*	*	*	1	1	LOOP CLOSURE
	*	*	*	0	1	NOT ALLOWED
	*	*	*	1	0	NOT ALLOWED
SDPO XMT	LOOP OPEN	0	0	*	*	NO SLEEVE GROUND, +
	LOOP CLOSURE	1		*	*	SLEEVE GROUND, +
SDPO RCV	*	*	*	0	*	NORMAL BATTERY
	*	*	*	1	*	REVERSE BATTERY

@ A and B signaling channel states are shown as they exist on the T1 line.

* Any state or condition.

+ Either normal or reverse battery.

Table 3.1a Channel Unit Signaling State Assignment

CHANNEL UNIT TYPE	OFFICE CONDITION TO CHANNEL UNIT	TRANSMITS @ SIGNALING A	TRANSMITS @ SIGNALING B	RECEIVES @ SIGNALING A	RECEIVES @ SIGNALING B	CHANNEL UNIT CONDITION TO OFFICE
	NO TIP GROUND, NO RINGING	1	1	*	*	*
XMT	TIP GROUND, NO RINGING	0	1	*	*	*
	TIP GROUND, RINGING	0	0	*	*	*
	NO TIP GROUND, RINGING////////////////////	?	?	*	0	(RING GROUND)////////////////////////////
	NO TIP GROUND, RINGING////////////////////	?	0	*	1	(NO RING GROUND)////////////////////////////
FXO						
	*	*	*	0	1	LOOP OPEN, NO RING GROUND
	(TIP GROUND)	0	*	0	0	LOOP OPEN, NO RING GROUND
	(NO TIP GROUND)	1	*	0	0	LOOP OPEN, RING GROUND
RCV	*	*	*	1	1	LOOP CLOSURE, NO RING GROUND
	(TIP GROUND)////////////////////////////////	0	*	1	0	LOOP CLOSURE, NO RING GROUND/////////
	(NO TIP GROUND)////////////////////////////	1	*	1	0	LOOP OPEN, RING GROUND//////////////////

CHANNEL UNIT TYPE	OFFICE CONDITION TO CHANNEL UNIT	TRANSMITS @ SIGNALING A	TRANSMITS @ SIGNALING B	RECEIVES @ SIGNALING A	RECEIVES @ SIGNALING B	CHANNEL UNIT CONDITION TO OFFICE
	LOOP OPEN, NO RING GROUND	0	1	*	*	*
	LOOP OPEN, RING GROUND////////////////////	0	1	0	*	(TIP GROUND)////////////////////////////
XMT	LOOP OPEN, RING GROUND	0	0	1	*	(NO TIP GROUND)
	LOOP CLOSURE, NO RING GROUND///////////	0	1	1	*	(NO TIP GROUND)////////////////////////////
	LOOP CLOSURE, NO RING GROUND	1	1	0	*	(TIP GROUND)
	LOOP CLOSURE, RING GROUND//////////////	1	1	0	*	(TIP GROUND)////////////////////////////
	LOOP CLOSURE, RING GROUND//////////////	0	0	1	*	(NO TIP GROUND)////////////////////////////
FXS						
	*	0	1	*	*	*
RCV	*	*	1	0	1	TIP GROUND, NO RINGING
	(LOOP CLOSURE)	1	1	0	0	TIP GROUND, NO RINGING
	(LOOP OPEN)	0	1	0	0	TIP GROUND, RINGING

@ A and B signaling channel states are shown as they exist on the T1 line.

* Any state or condition.

? Indeterminate.

/// Abnormal condition with no application.

( ) Condition existing at distant end of VF connection for receiver.

( ) Condition existing at distant end of overall connection for transmitter.

Table 3.1b Channel Unit Signaling State Assignment

CHANNEL UNIT TYPE	E&M SIGNALING CIRCUIT CONDITION TO PLR CHANNEL	TRANSMITS @ SIGNALING		RECEIVES @ SIGNALING		PLR CHANNEL UNIT CONDITION TO E&M SIGNALING CIRCUIT
		A	B	A	B	
PULSE	E-LEAD OPENED	0	0	*	*	*
LINK	E LEAD FROUNDED OR LOOPED (1)	1	1	*	*	*
REPEATER		0	0	*	*	*
(PLR)	*	*	*	0	*	M LEAD GROUNDED OR OPEN (1)
4W, 600	*	*	*	1	*	M LEAD BATTERY OR LOOPED (1)

@ A and B signaling channel states are shown as they exist on the T1 line.

* Either state or condition.

(1) Option selected by screw switch.

Table 3.1c Channel Unit Signaling State Assignment

SELF-TESTING

3.6 As previously noted, the 70A self-testing routine is executed automatically at power-up. This ensures that the user is alerted to any malfunction before the monitoring capability is used. the self-testing routine performs a comprehensive operational check of over 80% of the 70A circuitry.

The self-testing procedure is carried out as follows:

1. upon power-up all LED's are turned on for approximately 100 ms and then turned off.

2. starting with the top row, each channel LED is sequentially turned on at a rate of approximately 4 per second. The process continues on to the next three rows until all 96 LED's in the signaling display are lit.

3. each mode selection LED is sequentially turned on.

4. all LED's except that indicating mode selection A/1, B/1, A/2. B/2 are turned off and

5. the signaling display is ready to read the signaling states associated with line 1 and line 2.

The self-testing routine is carried out by a microcontroller. Should this microcontroller experience a malfunction, a checksum error is most likely to result. This is indicated by a blanked-out LED display and confirmed by a lit, red LED inside the 70A. This LED is visible through the left side venting holes. Failure of a display buffer or an LED will readily be noticed by observing an inconsistency when carrying out the self testing sequence.

It should be noted that if the 220A+/320A+ is operated on battery, the self-test routine can be initiated when AC is applied to the set. In this case it is not required to turn the power switch off and on.

4. ELECTRICAL PERFORMANCE CHECK

INTRODUCTION

4.1 This selection provides a set of procedures required to complete the electrical performance testing for the 70A. The procedures below require that the 70A be electrically connected to a 220A+, 320A+ or 440A in good working order.

REQUIRED TEST EQUIPMENT

4.2 Table 4.1 below contains the list of equipment required for testing the 70A operational conformity with its specifications.

Table 4.1 Required Test Equipment

Instrument Type	Suggested Model	Qty
DS-1 PCM source	T-COM model 515A	1
4 foot patch cord	ADC P/N PJ-718	2

TEST PROCEDURES

4.3 All the test procedures provided below apply to the test set-up shown in figure 4.1. In this set-up, the 515A T1 PCM output jack is patched to the 220A+, 320A+ or 440A line 1 input jack and the 515A MON PCM output jack is patched to the 220A+, 320A+ or 440A line 2 input jack. Testing must be carried out in the order given.

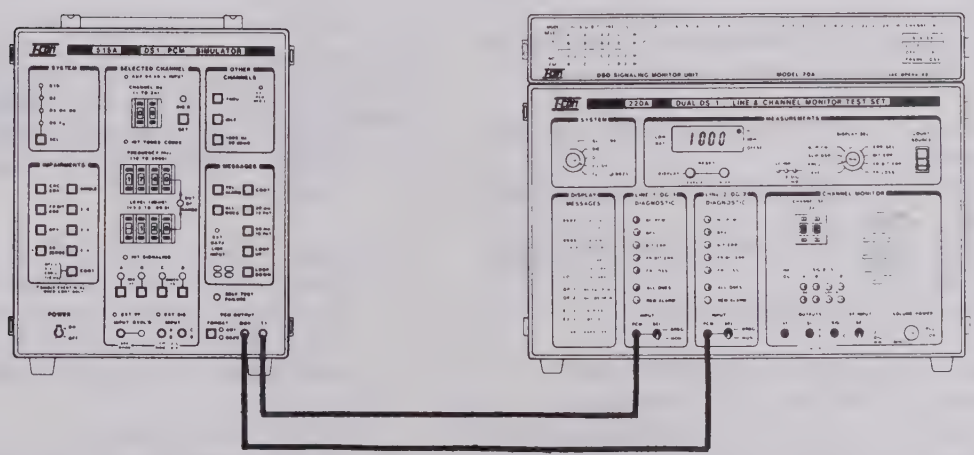

Figure 4.1 Performance check/test set-up

CHANNEL NUMBERING SEQUENCE CHECK

4.3.1 This test procedure verifies the channel decoding integrity for the five system selections: SLC-96, D1D, D2, D3/D4/D5 and D5-ESF.

Initialization:

Set the 515A controls as follows:

- POWER : ON
- SYSTEM : D1D
- OTHER CHANNELS : IDLE
- SELECTED CHANNEL : 01 (CHANNEL No)
- INT SIGNALING : A and B = 1 (red)

Set the 220A+, 320A+ or 440A controls as follows:

- POWER : ON
- SYSTEM : SLC-96
- LINE 1 INPUT SEL : BRDG
- LINE 2 INPUT SEL : MON
- CHANNEL SEL : 01
- DISPLAY SELECT : SLIP CNT

At this point, the following display should result:

220A+/320A+: - all LED's in the DIAGNOSTIC section are off
- SIG BITS A and B for line 1 and 2 are red
- the measurement display reads 0

70A : - A/1, B/1, A/2, B/2 LED is lit
- all channel signaling LED's are lit
- all other LED's are off

Test sequence:

1. on the 515A, set INT SIGNALING bit A to state 0 (green) and observe:
   - ▸ the 220, 320 or 440 A SIG BITS must change to green
   - ▸ the 70A A SIG BITS in channel 1 must turn off
   - ▸ no other LED state change occurs

2. on the 515A, set INT SIGNALING bit B to state 0 and observe:
   - ▸ the 220, 320 or 440 B SIG BITS must change to green
   - ▸ the 70A A and B SIG BITS in channel 1 must turn off
   - ▸ no other LED state change occurs

3. sequentially set the 515A CHANNEL No selection to 02, 03, 04 ... 24, and observe:
   - ▸ all LED's in the set channel number are off and
   - ▸ all the other SIG BIT LED's are turned on

4. Set the 220A+, 320A+ or 440A SYSTEM selection to D1D and repeat step 3.

5. Set the 515A and the 220A+, 320A+ or 440A SYSTEM selection to D2 and repeat step 3.

6. Set the 515A and the 220A+, 320A+ or 440A SYSTEM selection to D3/D4/D5 and repeat step 3.

7. On the 70A, depress the MODE SELECT switch and observe that the display does not change, except for the blinking of the NOT ESF LED during approximately two seconds.

8. If the 220A+, 320A+ or 440A is equipped with option 01, set the 515A SYSTEM selection to D5-ESF (or D5-Fe on some models) and repeat step 3.

MODE SELECTION/OPERATION CHECK

4.3.2 This test procedure verifies the integrity of the operation of the 70A in the three display modes compatible with the extended superframe format. If the 220A+, 320A+ or 440A is not equipped with option 01 (extended superframe compatibility), this procedure should be skipped.

1. With the 515A and 220A+, 320A+ or 440A setting unchanged from the previous steps, set the controls on these instruments as follows:
   - ▸ 515A CHANNEL No : 01
   - ▸ 515A INT SIGNALING : A=0, B=C=D=1
   - ▸ 70A : A/1, B/1, C/1, D/1

   and observe the 70A SIG BIT display, the SIG A LED in channel 1 is off while all the other LED's are lit.

2. On the 515A, sequentially set the INT SIGNALING B, C and D states to 0 and observe that the corresponding signaling LED's on the 70A in channel 1 turn off while all other LED's remain lit.

3. Set the 70A to display A/2, B/2, C/2, D/2 and observe that SIG BIT display remains unchanged. Set different combinations of the A, B, C and D signaling states on the 515A and observe that each combination is accurately displayed on the 70A.

4. Set the 70A to display C/1, D/1, C/2, D/2. When changing the 515A INT SIGNALING C and D BIT states, observe that the 70A accurately displays the new state selection for both line 1 and line 2. Note also that new selections of the A and B signaling bit states on the 515A doe not affect the 70A display.

5. When the 220A+, 320A+ or 440A SYSTEM selection is changed to D3/D4/D5, observe the following conditions on the 70A:
   - ▸ all signaling LED's turn off and
   - ▸ the SIG BIT/LINE selection automatically reverts to A/1, B/1, A/2, B/2.

DISPLAY BLANKING CHECK

4.3.3 The 70A signaling display LED's associated with a given PCM line must be turned off when the 220A+, 320A+ or 440A loses frame on this line. To verify proper blanking operation proceed as follows:

1. complete the initialization procedure outlined in paragraph 4.3.1

2. observe that all signaling bit display LED's are lit on the 70A front panel.

3. when pulling out the patch cord plug from the 220A+, 320A+ or 440A LINE 1 DIAGNOSTIC observe that the two top rows turn off.

4. when pulling out the patch cord plug from the 220A+, 320A+ or 440A LINE 2 DIAGNOSTIC observe that the two bottom rows turn off.

DISPOSITION

4.4 If the 70A performs every step as specified in the above procedures, its operation is in conformity with all the performance requirements specified for this unit. If a discrepancy is observed, the 70A and/or the 220A+, 320A+ or 440A should be sent for repair.

5. MAINTENANCE

INTRODUCTION

5.1 Because the model 70A contains no adjustment, it requires no periodic calibration check. The only recommended maintenance includes the cleaning of exterior surfaces. Should the instrument fail to operate properly, as evidenced by its inability to flawlessly complete the self-test sequence or any of the tests detailed in section 4, the 70A should be returned to T-COM for repair. Repair of the 70A by personnel non-trained to servicing this product is not recommended. Attempting to do so can result in voiding the warranty and in increasing the cost of repair by the factory.

CLEANING INSTRUCTIONS

5.2 The enclosure exterior surfaces may be cleaned occasionally using a mild soap solution. The use of detergents and mineral spirits must be avoided on the painted surfaces.

CAUTION

To avoid potential hazards introduced by water electrical conduction, the instrument must be disconnected from the AC power line and its power switch must be set to the OFF position during the cleaning process. Let the instrument dry completely before returning it to service.

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